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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/759,468	01/15/2004	Wei-Wei Zhuang	SLA0840	7589

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SHARP LABORATORIES OF AMERICA, INC.
C/O LAW OFFICE OF GERALD MALISZEWSKI
P.O. BOX 270829
SAN DIEGO, CA 92198-2829

EXAMINER

KALAM, ABUL

ART UNIT PAPER NUMBER

2814

DATE MAILED: 05/02/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/759,468

Applicant(s)

ZHUANG ET AL.

Examiner

Abul Kalam

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 March 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of claims 1-14 and cancellation without traverse of claims 15-23, in the reply filed on March 9, 2006 is acknowledged. Thus, claims 1-14 remain active in the application.

Claim Objections

2. Claims 1-14 are objected to because of a lack of antecedent basis. Claim 1 recites the limitation "surface-normal feature" in line 14 of claim 1. There is insufficient antecedent basis for this limitation in the claim. The limitation, "surface-normal feature," will be interpreted by the office, as the feature, normal with respect to the substrate surface. Claims 2-14 depend on claim 1 and thus are also objected to.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-14 are rejected under 35 U.S.C. 103(a) as being obvious over Zhuang et al. (2003/0148545) in view of Zhuang et al. (6,664,117) and Applicant's Admitted Prior Art (AAPA).

With respect to claim 1, Zhuang ('545) discloses a $\text{Pr}_{1-x}\text{Ca}_x\text{MnO}_3$ (PCMO) spin-coat deposition method for eliminating voids, the method comprising:

forming a substrate **12**, including a noble metal **14** ("platinum"), with a surface (pg. 2, [0018]);

spin-coating the substrate with a first, low concentration of PCMO solution (pg. 2, [0018]-[0019]);

spin-coating the substrate with a second concentration of PCMO solution, having a greater concentration of PCMO than the first concentration (pg. 2, [0018]-[0019]);

baking and rapid thermal annealing (RTA) (pg. 2, [0018]);

post-annealing (pg. 2, [0018]-[0019]); and,

forming a PCMO film **16** (pg. 2, [0018]-[0019]).

Regarding claim 2, Zhuang discloses two PCMO layers: 16a and 16b. It is implicit that layer 16a was formed with a lower concentration of PCMO solution than layer 16b, because 16a is a seed layer that includes nano-meter size crystals, while layer 16b, is an amorphous layer.

Thus, Zhuang ('545) is shown to teach all the features of the claim with the exception of disclosing:

spin-coating the substrate with acetic acid.

However, Zhuang ('117) discloses a spin coat deposition method wherein the substrate is spin coated with acetic acid (fig. 1, col. 3, Ins. 46-47).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Zhuang ('545) to include a step of spin-

coating the substrate with acetic acid as taught by Zhuang ('117), because acetic acids remain stable over a long time period and provide high solubility for the solid precursors used in the synthesis of PCMO spin-coating precursor solution (col. 3, Ins. 15-25).

Thus, Zhuang ('545) and Zhuang ('117) are shown to teach all the limitations of claim 1, with the exception of explicitly disclosing:

forming a feature, normal with respect to the substrate surface; and
forming a PCMO film overlying the surface-normal feature.

However, AAPA discloses forming a feature, normal with respect to the substrate surface and forming a PCMO film overlying the surface-normal feature (prior art, fig. 1).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the methods Zhuang ('545) and Zhuang ('117) by forming a surface-normal feature on the substrate and forming a PCMO film overlying the surface-normal feature, as disclosed by AAPA, because it is well known in the art to form vias or trenches for interconnection purposes.

With respect to claim 2, Zhuang ('545), Zhuang ('117) and AAPA teach the method of claim 1, and Zhuang ('545) further discloses wherein forming a PCMO film overlying the surface-normal feature includes forming a void-free interface between the PCMO film and the underlying substrate surface (fig. 1 shows a void-free interface).

With respect to claim 3, Zhuang ('545), Zhuang ('117) and AAPA teach the method of claim 1, and AAPA teaches wherein forming a feature, normal with respect to

the substrate surface, includes forming a surface-normal feature selected from the group including a trench and a via (prior art, fig. 1)

With respect to claim 4, Zhuang ('545), Zhuang ('117) and AAPA teach the method of claim 1. Regarding the limitation, "wherein spin-coating the substrate with a first concentration of PCMO solution includes applying a PCMO concentration in the range of 0.01 to 0.1 moles (M); and, wherein spin-coating the substrate with a second concentration of PCMO solution includes applying a PCMO concentration in the range of 0.2 to 0.5 M," it is given no patentable. Note, the specification contains no disclosure of either the *critical nature of the claimed* first PCMO solution with a "concentration in the range of 0.01 to 0.1 moles (M)" and a second PCMO solution with a "concentration in the range of 0.2 to 0.5 M," or any unexpected results arising therefrom. Where patentability is aid to based upon particular chosen dimension or upon another variable recited in a claim, the Applicant must show that the chosen dimension are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

With respect to claim 5, Zhuang ('545), Zhuang ('117) and AAPA teach the method of claim 1. Regarding the limitation, "wherein spin-coating the substrate with acetic acid includes spinning the substrate at a rate in the range between 1500 and 4000 revolutions per minute (RPM) for a time in the range of 30 to 60 seconds," it is given no patentable weight. Note, the specification contains no disclosure of either the *critical nature of the claimed* spinning rate in range between "1500 and 4000 revolutions per minute (RPM)" and duration time in the range of "30 to 60 seconds," or any unexpected results arising therefrom. Where patentability is aid to based upon

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particular chosen dimension or upon another variable recited in a claim, the Applicant must show that the chosen dimension are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

With respect to claim 6, Zhuang ('545), Zhuang ('117) and AAPA teach the method of claim 4. Regarding the limitation, "wherein spin-coating the substrate with a first concentration PCMO solution includes applying the PCMO solution while spinning the substrate at a rate in the range of 300 to 1000 RPM; and, wherein spin-coating the substrate with a second concentration PCMO solution includes applying the PCMO solution while spinning the substrate at a rate in the range of 300 to 1000 RPM," it is given no patentable weight. Note the specification contains no disclosure of either the *critical nature of the claimed* spinning rate in the range of "300 to 1000 RPM" or any unexpected results arising therefrom. Where patentability is aid to based upon particular chosen dimension or upon another variable recited in a claim, the Applicant must show that the chosen dimension are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

With respect to claim 7, Zhuang ('545), Zhuang ('117) and AAPA teach the method of claim 1. Regarding the limitation, "wherein spin-coating the substrate with a the first concentration of PCMO solution includes spinning the substrate at a rate in the range of at 1500 to 3000 RPM for a time in the range of 30 to 60 seconds; and, wherein spin-coating the substrate with the second concentration of PCMO solution includes spinning the substrate at a rate in the range of 1500 to 3000 RPM for a time in the range of 30 to 60 seconds," it is given no patentable weight. Note, the specification

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contains no disclosure of either the *critical nature of the claimed* spinning rate in range between “1500 and 3000 revolutions per minute (RPM)” and duration time in the range of “30 to 60 seconds,” or any unexpected results arising therefrom. Where patentability is aid to based upon particular chosen dimension or upon another variable recited in a claim, the Applicant must show that the chosen dimension are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

With respect to claim 8, Zhuang ('545), Zhuang ('117) and AAPA teach the method of claim 8. Zhuang ('545) further teaches wherein the baking includes:

baking the substrate at a temperature in the range of 120 to 180 degrees C for approximately 1 minute (pg. 2, [0018]);

baking the substrate at a temperature in the range of 200 to 250 degrees C for approximately 1 minute (pg. 2, [0018]); and,

Zhuang ('117) further teaches wherein the RTA includes:

rapid thermal annealing at a temperature in the range of 400 to 650 degrees C. for a time in the range between 2 and 10 minutes (col. 3, lns. 39-42).

With respect to claim 9, Zhuang ('545), Zhuang ('117) and AAPA teach the method of claim 9, and Zhuang ('545) further teaches repeating the second concentration of PCMO spin-coating, and baking and RTA procedures 1 to 5 iterations (pg. 2, [0018]).

With respect to claim 10, Zhuang ('545), Zhuang ('117) and AAPA teach the method of claim 10, and Zhuang ('117) further teaches wherein post-annealing includes

post-annealing at a temperature in the range of 500 to 600 degrees C for a time in the range of 10 minutes to 2 hours (col. 3, Ins. 44-46).

With respect to claim 11, Zhuang ('545), Zhuang ('117) and AAPA teach the method of claim 10, and Zhuang ('117) further teaches wherein post-annealing includes post-annealing in an environment selected from the group including air and oxygen environments (col. 3, Ins. 44-46).

With respect to claim 12, Zhuang ('545), Zhuang ('117) and AAPA teach the method of claim 1, and Zhuang ('545) further teaches wherein forming a substrate, including a noble metal includes forming a substrate from platinum (pg. 2, [0018]).

With respect to claim 13, Zhuang ('545), Zhuang ('117) and AAPA teach the method of claim 1. Regarding the limitation, "wherein forming a void-free interface between the PCMO film and the underlying substrate surface includes forming voids having a diameter of less than 50 Å between the PCMO film and the substrate surface," it is given no patentable weight. Note the specification contains no disclosure of either the *critical nature of the claimed* voids having a diameter of "less than 50 Å" or any unexpected results arising therefrom. Where patentability is aid to based upon particular chosen dimension or upon another variable recited in a claim, the Applicant must show that the chosen dimension are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

With respect to claim 14, Zhuang ('545), Zhuang ('117) and AAPA teach the method of claim 1, and Zhuang ('545) teaches wherein forming a PCMO film includes

forming a PCMO film having a thickness of 20 nm (pg. 2, [0027]), which is in the claimed range of 400 to 5000 Å.

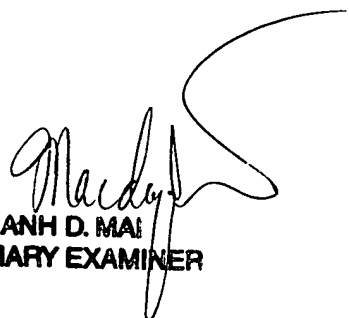
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Abul Kalam whose telephone number is 571-272-8346. The examiner can normally be reached on Monday - Friday, 9 AM - 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on 571-272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AK


ANH D. MAI
PRIMARY EXAMINER